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Remote interpretation

Report of the Secretary-General**

Summary

The present report reviews the background, organization and implementation of the second full-scale experiment in remote interpretation conducted by the United Nations. On the basis of the conclusions drawn from the experiment, a description is made of the body of knowledge currently available in the field of remote interpretation, covering telecommunications and other technical issues, the likely impact of remote servicing on the quality of interpretation and the working conditions of interpreters, and financial questions and the cost effectiveness of remote interpretation.

* A/56/150.

** The finalization of this report was postponed by two weeks after the prescribed date in order to include the most up-to-date available information concerning communication costs.

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Introduction

1. The present report is submitted in accordance with paragraph 5 of General Assembly resolution 54/248 D of 23 December 1999, and paragraphs 8 and 10 of section IV of resolution 55/222 of 23 December 2000. Other provisions of those resolutions that are relevant to the question of remote interpretation have also been taken into consideration in the preparation of the report.

I. First experiment and its legislative mandate

2. The United Nations conducted its first full-scale remote interpretation experiment from 25 January to 5 February 1999, when a two-week session held at Geneva was provided with interpretation in six languages by a team of interpreters working from Vienna. The experiment was considered to be "full-scale" because it entailed the use of all six official languages and the continuous use of remote interpretation throughout the duration of a typical United Nations session. A report on that experiment (A/54/176) was issued in 1999 and was considered by the Committee on Conferences and the General Assembly.

3. The experiment was undertaken in compliance with paragraph 20 of General Assembly resolution 53/208 A of 1 December 1998, in which the Assembly had requested the Secretary-General, without prejudice to the practices already used to meet interpretation requirements, to examine the provision of interpretation services to other locations from permanent interpretation structures based in New York, Geneva, Vienna and Nairobi and to report thereon.

4. One conclusion reached on the basis of the first experiment was that the use of high-capacity digital telephone lines (the integrated services digital network, or ISDN) made it technically possible for interpreters at a remote location to service meetings held at a different location, during a continuous period of two weeks, without disruptions to the participants and to their nearly complete satisfaction. Specifically, sound of a quality very close to the standard requirements for simultaneous interpretation was reliably transmitted thanks to the use of a sufficient number of ISDN links.

5. Other conclusions, drawn from questionnaires answered by the interpreters, were less positive. The quality of the visual information about the meetings and the speakers that the interpreters received by means of two videoconferencing systems was deficient in several respects. Interpreters found that video broadcasts using insufficient bandwidth led to considerable eye strain; that sudden camera movements caused dizziness and loss of concentration; and that it was difficult to find a satisfactory compromise between the amount of light used in the room where the screens were placed and the sharpness of the projected image. In general, interpreters indicated that they needed to see what was taking place in the meeting room. They said that, under normal on-site conditions, they selected various views of the speaker and their audience only when these views did not interfere with the simultaneous processing of all the other information required for interpretation. Working remotely, on the other hand, the interpreters felt that the selection and timing of video images by a camera operator for the entire team could not substitute for their own individual selection and timing of the images. Video broadcasts as a substitute for being in the meeting room had serious limitations.

6. Although 94 per cent of the users surveyed were satisfied with the quality of the interpretation during the session, interpreters were dissatisfied with the quality of their work. They stressed that they were able to maintain their performance at an acceptable level, but only at a higher psychological and physiological cost. The experiment established that remote interpretation had a cumulative effect on interpreters' health, pointing to stress, fatigue, eyestrain, loss of concentration, lack of motivation and overall anxiety. Since it could be argued that, with better visual information, the health impact perhaps would have been less significant, a major recommendation derived from the first experiment was that, in future experiments, technological solutions had to be sought that might bring the physical environment of remote interpretation as close as possible to normal on-site conditions.

II. Need for a second experiment and its legislative mandate

7. After the first experiment, it was felt that, since United Nations meetings for which the use of remote

interpretation could be contemplated are convened in many different locations, the feasibility and potential of remote interpretation in the United Nations context needed also to be assessed in circumstances requiring the use of satellite services. That was highlighted by the objective of increasing the number of United Nations and other meetings held at the United Nations Office at Nairobi, where no ISDN services and no interpretation staff were available in 1999.

8. In late 1999, preparations were begun for an experiment involving the servicing from Geneva of a session held at Nairobi. Communications would be established through the Mercure satellite connection between Nairobi and Leuk, Switzerland, which the European Space Agency (ESA) makes available to the United Nations Environment Programme. The capacity of the satellite connection needed to be upgraded with additional bandwidth, which could be leased commercially. Other improvements in telephone lines at both ends and purchases or rental of videoconference and communications equipment were also necessary. In addition, some components used in the Vienna-Geneva experiment had to be shipped on loan from Vienna to Nairobi. In 2000, the calendar of meetings at Nairobi included only one session, scheduled for 8 to 12 May, that was suitable for a full-scale experiment.

9. Failure to secure timely confirmation from ESA that it would lend the six modems required for the experiment and delays in preparatory tests led to the cancellation of the experiment, which could not be rescheduled because, as indicated, there was no other meeting that would be suitable for a full-scale test. A report on the matter was issued in July 2000 (A/55/134) and considered by the Committee on Conferences, the Advisory Committee on Administrative and Budgetary Questions (ACABQ) and the General Assembly.

10. In 1999, the Committee on Conferences, having examined the report on the first experiment (A/54/176), commended the efforts of the Secretariat to develop a system of remote interpretation and looked forward to additional experiments in the future. The Committee requested the Secretariat to further refine the cost considerations of remote interpretation, taking into account not only technological possibilities but also the cost benefits of remote interpretation, including the relative cost advantages of the different conference centres that were likely providers of remote interpretation services, and to report thereon.[1]

11. The General Assembly, in its resolution 54/248 of 23 December 1999, decided that, in the absence of an Assembly decision to the contrary, the use of remote interpretation should not constitute an alternative to the current institutionalized system of interpretation, and that the use of remote interpretation should not affect the quality of interpretation or in itself lead to any further reductions in language posts, nor should it affect the equal treatment of the six official languages. At the same time, the Assembly requested the Secretary-General to keep under review the introduction and use of any new technology, in particular remote interpretation, and to report thereon to the Assembly on a regular basis.

12. In 2000, the Committee on Conferences, having considered the report on the cancellation of the Geneva-Nairobi experiment, requested the Secretariat to keep it informed of future activities; reiterated its understanding that remote interpretation was not intended to replace traditional interpretation without the explicit approval of the General Assembly; requested that future reports include an analysis of the cost of any proposed system and of its impact on the working conditions of interpreters; and recommended that remote interpretation not be confined to specific duty stations, that each duty station be considered both as recipient and provider and that the Secretariat explore every opportunity for its introduction.[2] ACABQ, for its part, regretted that the Geneva-Nairobi experiment had not taken place and urged the Secretariat to clarify the technical issues involved as quickly as possible (see A/55/430, para. 10).

13. The General Assembly, in its resolution 55/222 of 23 December 2000, reiterated the provisions included in resolution 54/248. In addition, it reiterated its understanding that the introduction of remote interpretation was not intended to replace traditional interpretation systems without the explicit approval of the General Assembly; it requested the Secretary-General to ensure that trials of remote interpretation not be confined to specific duty stations, and that each duty station be considered as both recipient and provider; and it requested the Secretary-General to ensure that future reports include an analysis of all costs of any proposed system, its impact on the working conditions of interpreters, the level of service provided to delegates, the satisfaction of delegations with the interpretation and the technical aspects of this method of interpretation. The Assembly also took note

of the technical difficulties and timing problems that had prevented the Geneva-Nairobi experiment and requested the Secretary-General to further clarify the technical issues involved.

III. Aims of the second experiment

14. In view of the conclusions drawn from the first experiment and considering the mandate developed by legislative bodies, it was decided to conduct a second full-scale experiment aimed at: (a) testing the suitability of satellite links for remote interpretation purposes; (b) designing and testing the best possible configuration of video technology that can be used for remote interpretation purposes; (c) assessing the impact of remote interpretation on interpreters' working conditions when the best possible video equipment is used; and (d) gathering information on the costs of remote interpretation systems.

15. As had been the case with the first experiment, the test had to cover a sufficiently long period of time in order to prove the sustained reliability of the technology and to determine the cumulative effect of remote interpretation on the work of the interpreters and other conference-servicing staff, as well as on participants at the meeting. The meetings chosen should offer a wide variety of interpreting situations (both highly structured meetings and meetings with frequent spontaneous interaction) and entail the use of all six languages, in order to test relays between languages and to assess the effects of remote interpretation on participants using different languages.

16. It was felt that those objectives could be achieved by means of an experiment in which interpreters would work from booths other than those of the conference room where the meetings were taking place, but still located at the same conference centre. That would simplify the organization of the experiment. It would prevent the reoccurrence of the coordination difficulties that had led to the cancellation of the Geneva-Nairobi experiment. It would also reduce the potential cost of the experiment, essentially because a second team of interpreters would not be needed as a standby to be used in case of a technical failure.

17. At Headquarters, the Information Technology Services Division, Office of Central Support Services, Department of Management, could provide technical support and use could be made of the United Nations satellite network; therefore Headquarters was selected as the site for the experiment. Considering the nature of the different forthcoming meetings and the availability on specific dates of a second conference room from which interpreters could work remotely, it was decided that remote interpretation would be provided on a trial basis for the ninth session of the Commission on Sustainable Development, from 16 to 27 April 2001. The meetings would take place in conference room 3 and interpretation would be provided from the booths in conference room 6.

IV. Characteristics of the session of the Commission on Sustainable Development

18. In addition to representatives of the 53 States members of the Commission on Sustainable Development, participants included observers from many other States and representatives of local authorities, scientific communities, non-governmental organizations, trade unions and business and industry, as well as different international organizations. Interactive dialogues involving these varied groups of participants took place during the first two and a half days of the session, without prepared lists of speakers and at a rate of about two minutes allowed to each speaker. The following two days were devoted to the high-level segment, when government representatives (ministers and other high-level policy makers) delivered prepared statements at fast speeds limited to five minutes each. The second week of the session was entirely taken up by drafting work, involving a reduced number of active participants.

19. The session thus offered the opportunity to test remote interpretation in fairly different meeting formats. Contrary to the first experiment, when only a relatively small group of participants had been involved, the Commission on Sustainable Development resembled a full membership plenary conference. The proceedings were conducted in a large conference room, which was filled to capacity most of the time.

20. Remote interpretation was actually done during 16 meetings. In general, the first week called for the team of interpreters to work a full schedule of very demanding interpreting situations unrelated to the difficulties of remote interpretation. The second week proved easier in terms of interpretation content and

workload (meetings started late, finished early or were interrupted and the Commission on Sustainable Development cancelled one meeting and devoted another one to informal drafting work without interpretation). The interpreters did not seem to think that one type of meeting lent itself more to remote interpretation than another. Under normal conditions, the first week would have been more difficult as well. As it turned out, most of the session was conducted in English. The spokespersons for the Group of 77 and the European Union, who were by far the most active participants during the drafting exercises of the second week, were both English speakers. Therefore, relay and retour could not be really tested during the experiment. During the mock meetings held the week before in preparation for the experiment, however, interpreters were able to test the satellite link in those situations and the technical set-up was found to be suitable.

V. Organization and conduct of the experiment

A. Interpretation services

21. Interpretation was provided remotely by a team of 20 interpreters who volunteered or accepted to be assigned for the experiment. They were all permanent staff interpreters from Headquarters (eight), Geneva (six) and Vienna (six). The involvement of staff from the three main duty stations was considered important, in view of the possible implications of the use of remote interpretation for interpreters at all duty stations, as well as the requirement from the General Assembly that each duty station be considered both as recipient and provider of remote services.

22. One additional interpreter worked throughout the experiment from the remote location as a liaison with the conference officers working both on-site and at the remote location and with the audio and video technicians, with whom she remained in permanent contact via intercom headset. That connection was used to help spot the speaker by the cameras and also to receive feedback from the remote location to adjust the video coverage in accordance with requests from the interpreters, as conveyed by the interpreter providing liaison.

B. Conference officers and distribution officers

23. A senior conference officer working at the meeting site was designated the primary contact with the Secretary of the meeting. An additional conference officer was assigned to the remote site. The number of participants and the methods of work of the Commission on Sustainable Development require the assignment of an assistant conference officer to each meeting, in addition to the senior conference officer. During the experiment, the number of assistant conference officers was increased to two in an effort to speed up the collection of speakers' lists and all statements and texts available, which were delivered to the remote location by two messengers especially assigned to those meetings. Distribution services at the meeting site were provided by the normal number of staff, with one distribution officer being added at the remote site. The conference officer and the distribution officer working off-site were able to follow the proceedings via video and audio transmission.

24. The additional task of maintaining direct and timely communication with the remote location added to the workload of the senior conference officer working on-site. For the conference officer and the distribution officer at the remote location, the primary task was to receive documentation through the messengers and distribute it to the interpreters and to maintain communication with their counterparts working on-site. Not having to interact with participants reduced their overall workload in comparison with on-site conditions. This would make it possible for them to handle fax traffic or photocopying work during actual remote servicing conditions, when texts could not be walked to the remote location.

C. Sound transmission

25. Under the standards of the International Organization for Standardization applicable to simultaneous interpretation equipment, the minimum sound bandwidth acceptable for interpretation purposes is 12.5 kHz. Prior to the experiment, a sound quality test was conducted, during which interpreters were asked to rate remote connections through satellites providing feeds of 20 kHz and 14 kHz. Interpreters determined that the 14 kHz level assured good quality sound and was actually more suitable than the 20 kHz

level, where background noise was a problem. On that basis, during the experiment the original statements were transmitted to the interpreters using one audio channel at 14 kHz. Since requirements for the satisfactory transmission of interpretation output are not as strict, and in order to save bandwidth, six channels at 10 kHz were used to transmit the interpretations to the participants.

26. From conference room 3 (the meeting location), the floor sound was transmitted, using cables, codecs and modems installed in the satellite earth station at Headquarters, to the satellite, where it was looped and sent back by the same means to the interpreters working in conference room 6 (the remote location). The floor sound and the six language channels were likewise transmitted via satellite back from conference room 6 to the participants in conference room 3.

27. Once the sound system was installed, no staff involvement was needed for the sound transmissions between the two conference rooms, which remained stable at the expected level of quality during the entire experiment. Two audio engineers, one in each conference room, worked during the experiment. The fact that the floor sound travelled throughout the circuit, all the way to the satellite and back, resulted in a clearly perceptible delay between the sound transmitted by the public address system in conference room 3 and the sound received through the earphones. Comments about the presence of an "echo" were evidence of this.

D. Visual information

28. Since one of the purposes of the experiment was to improve as much as possible on the video system used in the first experiment, all efforts were made to use the best video technology and services available. Three cameras were installed in conference room 3 in booths above the meeting area, handled by three operators. One camera faced the participants and was used to capture the image of the speaker. The other two cameras faced the podium: one focused on the chairman or other officers, while the second one was used to provide general views of the room. In addition to the three camera operators, a television director, assisted by a technician, supervised the video transmissions and decided how to switch among the images captured by the three cameras.

29. In conference room 6, the set-up that was finally chosen by the interpreters consisted of six pairs of displays, each pair placed directly in front of each booth. Each pair consisted of one 42" plasma screen at booth level, 14 feet from the booth, and one 25" monitor at table level, 11 feet from the booth. The screen was used to project the image of the speaker and general views of the room, before the start of the meeting, while the monitor provided views of the podium and of the presiding officer as speaker.

30. Transmissions originated in the cameras in conference room 3. Via different combinations of videoconferencing systems, inverse multiplexers, codecs, modems, hard wire and ISDN phone lines, images were sent to the satellite, where they were looped and sent back using the same links. At the video control centre, the television director selected among the images received and forwarded them to the interpreters in conference room 6.

31. As the rates used for data transmission affect the quality of the image, the rates for each type of image were determined on the basis of the usefulness of each type for the interpreters. Interpreters considered that the image of the speaker was the most important one. Accordingly, it was assigned a rate of 512 kbps and was projected on the 42" plasma screen. The image of the podium was given a rate of 384 kbps and was projected on the 25" monitor. That was the set-up finally selected by the interpreters and it was used during the second week of the experiment. During the first week, the larger screen, with 128 kbps, had been used to provide general views of the meeting room, while one 25" monitor with 384 kbps gave a view of the speakers and a second 25" monitor with 256 kbps gave a view of the podium. Interpreters felt that those images were not clear enough to be useful and proposed reducing the number of images from three to two, in order to achieve better quality within approximately the same available bandwidth. One monitor was removed, but the third camera was kept in operation and was used to feed alternating views of the podium or the room at the discretion of the television director. Therefore, between the first and the second weeks, the rate for the plasma screen (image of the speaker) was increased from 384 to 512 kbps and the rate for one monitor (alternating images of the podium or the room) was increased from 256 to 384 kbps.

E. Communications issues and technical findings

32. The United Nations leases satellite capacity from two service providers. The Information Technology Services Division uses 47 MHz of this capacity to support a total of 44 links via an earth station with an 11-metre antenna located at Headquarters. These links provide voice, data and videoconference communications services. For the experiment, the Division temporarily reassigned 4.85 MHz of its bandwidth and was thus able to support the experiment within its normally available capacity. An audio-video control centre was set up to route and control the transmissions to and from the two conference rooms and to and from the satellite earth station. The staff of the centre included two videoconference operators, two television engineers and one assistant, in addition to the television director and his assistant, who controlled the camera functions.

33. At most locations, the audio-video systems connecting the conference rooms and the control centres provide high-speed and reliable transmissions because they are hard-wired, since they are quite close to each other. This is not necessarily the case between control centres and satellite earth stations, which can be quite far away from each other. In these cases, the use of ISDN lines can offer a solution. In order to compare the performance and reliability of ISDN lines with those of hard-wire connections, both approaches were used in the experiment for the transmission of video. For audio, only hard-wire connections were used.

34. In the course of the experiment, the audio and video transmissions using hard-wire connections were never interrupted. This proved the reliability of cable connectivity and of satellite performance. Connections through ISDN lines, on the other hand, presented some problems. Following interruptions during the first few days and cases in which the images froze, the circuits used for the experiment were retested by the service provider and stability improved. Even so, video transmissions involving ISDN lines continued to go down once or twice a day for about one minute. This could be attributed to the quality of the ISDN lines or the interface between ISDN lines and the satellite, the videoconference equipment or the inverse multiplexers.

35. When several ISDN lines are used to transmit a particular image, the transmission will be interrupted even if just one line goes down. This means that, as the number of lines is increased to improve the quality of the image, the risk of interruptions will also increase, particularly if the lines are used for long periods of time (several hours in the case of remote interpretation). This risk factor must be kept in mind as a trade-off to improvements in video quality.

36. Past experience with videoconferences shows that ISDN lines can provide acceptable communications links. The first full-scale experiment on remote interpretation also used ISDN lines and was not affected by interruptions. The quality of the lines, however, varies from one service provider to another and among different locations. It is necessary, therefore, to make sure that the best quality service available is used. Also, since the new models of videoconference equipment adjust themselves more flexibly for quick signal recovery and resynchronization, these new models should be used for remote interpretation.

37. The experiment proved that satellite services are a viable communications means. The satellite service remained stable at all times. While the 4.85 MHz used for the experiment can be considered a large amount of bandwidth, this did not cause any interruption in other communications handled by the Information Technology Services Division through the satellite, and the normally available capacity could be used without additional cost. It should be noted, however, that satellite services for remote interpretation can be quite expensive if extra capacity needs to be obtained commercially. Besides, if remote interpretation is conducted in a location where an earth station is not available, this service must then be acquired commercially or a mobile station must be provided. Either option will be expensive.

38. Images transmitted to a large 42" plasma screen using 512 kbps represented a marked improvement in comparison with the visual information given to the interpreters in 1999, during the first full-scale remote interpretation experiment. Further improvements should be weighed against the cost of data transmission. Although it was known that there would be a delay between the video and the audio at the remote site, resulting from the different rates at which audio data and video data were going to be transmitted to the satellite and back, the disruptive effect that the lack of synchronization had on the interpreters was originally underestimated. After the third day, the

audio signal received from the satellite was delayed by 3 milliseconds before it was forwarded to the interpreters. This improved significantly the synchronization of audio with video.

F. Participants' assessment of the experiment

39. During the two weeks of the session of the Commission on Sustainable Development, no complaints or comments of any nature were received from members of delegations or other participants about the quality of the interpretation services being provided. At the last four meetings of the session, a questionnaire was distributed in all languages asking participants to indicate if, during the session, the sound and the remote interpretation had been (a) of about the same quality as the sound and the interpretation when on-site services were provided, (b) of poorer quality, or (c) of better quality. Some participants only became aware of the fact that interpretation had been provided remotely when they saw the questionnaire.

40. The response rate was very low. Only 23 completed questionnaires were received, 14 from persons speaking in English or listening to interpretation into English, and 9 from users of other languages (4 Spanish, 3 French and 2 Arabic). Among the 14 users of English, 13 found no differences in quality in either interpretation or sound, and one felt that both had been of poorer quality than under on-site conditions. Among the nine users of other languages, six saw no difference in sound and three found it to be worse. The rating of interpretation quality in this group was much less favourable: while four saw no difference in quality, five considered it of poorer quality than on-site interpretation.

41. The low number of responses limits considerably the validity of this information. However, in the light of the fact that interpretation into English was required very infrequently because most of the session was conducted in English, the views of users of other languages can be considered particularly relevant. In any event, as indicated in paragraph 39, the dissatisfaction that those replies show did not lead to complaints during or after the session.

G. Interpreters' assessment of the experiment

42. Using a questionnaire very similar to the questionnaire used during the first experiment, after each meeting the interpreters were asked to evaluate different components of the sound and video information and the support services available to them during the experiment, as well as to assess the degree of physical and psychological effort that working in remote conditions entailed. Interpreters were asked to compare these parameters with normal, on-site conditions and to use a scale ranging from -5 to +5, where the negative values represented a deterioration, and positive values an improvement vis-à-vis normal on-site conditions.

43. The response rate was high across the board, for all interpreters and all variables, and roughly equivalent to 85 per cent. The averages of the ratings from all 20 interpreters covering the 16 meetings for which remote interpretation was provided reveal that interpreters feel that the quality of sound (-0.3) and the quality of support services (-1) was comparable to or only slightly worse than the levels prevailing under normal on-site conditions. The overall sound quality was rated better than in the first full-scale experiment (up from -0.8 to -0.3) and it would have been even closer to normal conditions if it had not been for the echo and synchronization. The visual information, on the other hand, was seen as of clearly poorer quality than the visual information available when working on-site (-2.1). Remote interpretation also demanded greater physical effort (-2.1) and led to higher psychological stress than normal on-site work (-2.4).

44. The evolution of the ratings over the two-week period was also reviewed. Values do not reveal any consistent pattern. The reconfiguration of the video set-up between the first and the second week seems to have resulted in a very small improvement in the perceived quality of the visual information. Together with the fact that, during the second week, the meetings were less difficult to interpret, the reconfiguration may have contributed to a stabilization of, and even a slight reduction in, the physical and psychological effort accompanying remote interpretation.

45. The averages of all individual ratings are valid indicators of the most prevalent view of remote interpretation among the interpreters who participated in the experiment. As it is frequently the case with

averages, they hide wide degrees of variability, or wide spreads around the average. On the other hand, a high degree of consistency at the personal level is evident: individuals who have a more positive view of the quality of the visual and sound information available to them also feel less burdened by remote working conditions, and vice versa.

H. Conclusions of the second experiment

46. The experiment allowed for testing remote interpretation in a variety of meeting formats: impromptu exchanges of views, prepared statements read at high speed, informal negotiations and drafting sessions. Interpreters did not seem to think that one type of meeting lent itself more to remote interpretation than another. Relay and retour could not be tested, since the overwhelming majority of the statements were in English.

47. The experiment showed that satellite communications can be reliably used in remote interpretation. The satellite link remained stable and provided very good sound and video transmissions when the ground segment was via hard wire. The ISDN lines used for the transmission of video signals require further attention. The interruptions that were experienced in that connection may be due to different factors that need to be determined, but may partly be a result of the simultaneous use of a relatively high number of lines in an effort to improve the quality of the images transmitted. Trade-offs between visual quality and transmission stability may be required.

48. Apart from the information provided by means of the questionnaires, the interpreters who participated in the experiment considered that an acceptable level of service had been provided by them, but that striving to maintain high professional standards under adverse conditions and to compensate for a feeling of alienation had taken a toll on the team in terms of increased fatigue. Although the sound was very good, there was an echo problem and sometimes a disorienting lack of synchronization between sound and image. For many interpreters, that remained a major problem throughout the two weeks and added to the stress they experienced.

49. Many interpreters felt that the adjustments made to the video set-up had resulted in improvements in picture quality. The image of the speakers on which most interpreters relied, however, was not always clear or stable, causing loss of concentration. Interpreters who had participated in the first experiment felt that it was better to work in a lit room, with screens placed at a more natural distance from the booths. The loss of visual information, however, remained a definite handicap. A panoramic view of the conference room providing useful information was unattainable with the technology used during the experiment. In live meetings, interpreters rely on being able to see delegates other than those actually speaking, and excellent video information might go some way towards compensating for other inherent deficiencies of remote work.

I. Cost of the experiment

50. As indicated in the relevant sections above, in addition to the staff that would normally service a session of the Commission on Sustainable Development, it was necessary to redeploy the following staff from other duties to the experiment on a full-time basis for two weeks: one interpreter to ensure liaison between the servicing room and the meeting room, two conference officers, one documents distribution officer, two messengers, one audio engineer, two videoconference operators, two television control engineers and three wide area network technicians. Extensive work by regular staff was also needed before the session for preparatory work, including equipment tests. In addition, three camera operators, one television director and two assistants were recruited specifically for the experiment. Related expenditures covering the salaries of the external staff and overtime for regularly available staff amounted to $32,700.

51. Most of the equipment used in the experiment was already available in-house. However, it was necessary to purchase four low-speed satellite modems, four audio codecs, four audio receivers and one block deconverter at a cost of $51,800. ISDN lines needed to be installed between the control centre and the satellite earth station. Installation costs amounted to $4,063 and actual use to $1,952. Satellite use did not give rise to additional expenditure, since part of the transmission capacity normally available to the Organization was reassigned to the experiment.

J. Observers attending the experiment

52. All organizations and academic institutions that have participated as members or observers in recent Inter-Agency Meetings on Language Arrangements, Documentation and Publications (IAMLADP) were notified of the experiment and were invited to send observers. Managers or senior members of the interpretation, administrative or technical services of the following organizations observed the experiment: International Civil Aviation Organization, World Bank, International Monetary Fund, International Telecommunication Union, International Maritime Organization, World Intellectual Property Organization, European Commission, European Parliament, Organisation for Economic Cooperation and Development, Organization of American States and United States Department of State.

VI. Conclusions: current perspectives on remote interpretation, including cost-effectiveness

53. After two full-scale experiments and although progress has been made, efforts to find technological solutions that could bring the physical environment of remote interpretation as close as possible to normal on-site conditions have been only partially successful. During the second experiment, by using higher rates of data transmission, camera operation that excluded sudden movements and panning and new screen technologies, it was possible to see the images without having to work in a dark or semi-dark room. However, the prevalent view among interpreters is still that remote interpretation will yield service at the level of quality that is customary in simultaneous interpretation only at the expense of added stress and fatigue. This health impact of remote interpretation is primarily due to the deficient synchronization between sound and image and the inability to obtain the visual information that is available on-site — two problems which require technological solutions not found so far — and to the sense of alienation, which can only be overcome through a process of adaptation to a different working environment on the part of interpreters trained to work on-site. After the second experiment, it is evident that, so long as maintaining an acceptable level of quality of service in a new working mode requires additional physical and psychological effort, typical individual workloads expected during on-site work would need to be reduced if remote interpretation were to be used.

54. The audio, video and communications equipment and the staffing and organizational arrangements for remote interpretation should be at least those used in the second experiment and described in paragraphs 25 to 38 above. Although still imperfect, they represented a marked improvement in comparison with the first experiment and provided the best technical environment for remote interpretation in six languages currently available to the Organization.

55. Related communications capacity should be as follows:

(a) Sound:	
(i) One ISDN line for the transmission of the floor sound to the interpreters (14 kHz)	128 kbps (with data compression)
(ii) Three ISDN lines for the transmission of the six languages back to the meeting (10 kHz)	384 kbps
(b) Video:	
(i) Four ISDN lines for the transmission of the speaker image to a 42" plasma screen	512 kbps
(ii) Three ISDN lines for the transmission of the podium/room image to a 25" monitor	384 kbps
Total	**1 408 kbps**
(c) Satellite (when the two locations cannot be linked via ISDN)	4.85 MHz

When satellite service is involved, the need to use ISDN lines at the meeting location and/or at the servicing location depends on the proximity of the earth stations and on whether it is feasible or efficient to link them to the meeting place or to the interpreters' booths by hard wire.

56. Satellite links have proved to be reliable for remote interpretation purposes. The satellite capacity regularly available to the United Nations could make remote interpretation between Nairobi and New York financially viable, if part of the existing bandwidth is reassigned for this purpose. Other existing satellite links cover communications with the locations of peacekeeping missions and it is highly unlikely that these could be assigned to remote interpretation. Geneva and Vienna are not covered by the

Organization's satellite communications system. Since satellite services can be quite expensive, remote interpretation should not be considered if extra capacity has to be obtained commercially.

57. As was done in the report prepared after the first experiment (A/54/176), in order to have a very general picture of the comparative cost-effectiveness of each servicing modality, a comparison between the likely costs of daily subsistence allowance (DSA) for interpreters and of ISDN communications is given below for the venues of several forthcoming meetings. Information on DSA has been taken from the July 2001 circular issued by the International Civil Service Commission (ICSC/CIRC/DSA/314). In order to obtain up-to-date information on ISDN rates, different vendors were contacted. The rates used below are the most favourable rates for global ISDN services from New York offered to the United Nations as at the date of the present report.

58. Since it is impossible to make assumptions about many servicing requirements, this very crude comparison assumes that any costs other than DSA and ISDN communications impacting either one of the terms of the equation would balance each other out. Savings in interpreters' travel expenses, for example, would be counterbalanced by additional costs, such as labour costs for technical set-ups, camera operators' salaries, the salary of conference room staff needed at the remote site, the cost of the transmission to interpreters of documents originating at the conference site, telephone traffic between the meeting and the interpreters and perhaps a number of incidentals impossible to foresee.

59. Paragraph 55 above shows that remote interpretation communications require 1,408 kbps, that is, 11 ISDN lines of 128 kbps each. Assuming that a two-week session is held, consisting of 20 three-hour meetings, each requiring a three-and-a-half-hour connection to allow for checking before the actual opening, ISDN links are needed for a total of 4,200 minutes. For the on-site servicing of a two-week session comprising 20 meetings, the presence of 20 interpreters would be needed. They would have to be paid DSA for 13 days. Kingston, Jamaica, is a frequent venue of meetings provided with on-site interpretation. The cost of one 128-kbps line from New York to Kingston is quoted at $1.71 per minute. Communications costs would amount in this case to $79,002. The current DSA for Kingston is $142. Total DSA would amount to $36,920. In this case, communications costs are more than double the cost of DSA.

60. The ratio between DSA and ISDN rates varies widely depending on the location of meetings. In the case of Kingston, it is 0.47 (36,920/79,002). In 2001 and 2002, meetings are being held or are likely to be held in 12 other cities in countries to which ISDN rates from New York are available. The corresponding DSA/ISDN ratios estimated as explained in paragraph 59 are as follows:

The Hague	1.73	Brussels	0.92
Geneva	1.42	Madrid	0.73
Vienna	1.21	Johannesburg	0.45
Berlin	1.18	Indonesia*	0.44
Santiago	1.16	Bangkok	0.36
Bonn	1.05	Durban	0.30

* Based on the Jakarta DSA. The specific venue is still to be determined.

61. A convenient rule of thumb could be that, when a direct comparison of DSA costs and communication costs indicates that the former are lower than the latter, prima facie there would be no reason to consider the use of remote interpretation. On the other hand, when communications costs are clearly lower than DSA, there could be financial reasons to consider the use of remote interpretation, subject to further analysis of the overall relevant costs under specific and well-defined servicing assumptions.

62. However, the combination of currently available technical and human resources does not provide a working environment sufficiently conducive to effective simultaneous interpretation. At the technical level, the second experiment revealed that there can be uncertainties and trade-offs between the volume of data transmitted via ISDN lines and the stability of the transmissions, with resulting limitations in the search for ever better visual information. At the human resources level, interpreters trained to work on-site cannot perform with the same efficiency when they work remotely.

63. In these circumstances, future activities that foster the accumulation of experience among interpreters working on-site at meetings which have some of the characteristics of remote meetings, namely

a videoconference component, will be of benefit. Future advances in the videoconferencing and communications areas must be continually assessed to determine whether they can offer solutions to the outstanding technical problems of remote interpretation. The potential financial advantages of remote interpretation in certain cases, together with the additional flexibility in the use of interpretation services that it can offer, justify further work along these lines.

Notes

[1] See *Official Records of the General Assembly, Fifty-fourth Session, Supplement No. 32* (A/54/32), para. 61.

[2] See ibid., paras. 124 to 127.